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Nonlinear Processes in Geophysics
Discussions
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Interactive comment on "Brief communication: Electron pair donors and Earth's energy generation" *by* Frederick Mayer

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Author's General response to s. Gariglio (Referee 1):

First, the Author wants to thank Referee 1 for his close reading of, and suggestions for, my "Brief communication: Electron pair donors and Earth's energy generation". These comments have helped make the presentation clearer. Furthermore, I have tried to make all the changes that reflect the issues Referee 1 has brought-up. Except for trying to argue details of the Cooper pair microphysics. Here, I referenced the Referee 1's paper and some in my Author's Comment that points to some possibilities. Unfortunately, there is no obvious mechanism for the Cooper pair formations in the geophysical setting. The requirement for some process leading to an electron pair

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being donated in the tresino energy generation according to quantitative success of our earlier NPG (Mayer and Reitz, 2014) paper has made the Cooper pair a reasonable alternative choice.

Author's Specific response:

"The output of a series of model calculations is plot in Figure 2 and, to my understanding, is the main scientific information the paper is providing". This is correct except for the possibility of Cooper pairs playing an energy generation role.

Author's Specific response:

"It would be important to show the behavior of the long term He isotopes ratio for proton content larger than paper 6x10ËĘ20 cmËĘ-3." It turns out that above this particular value, the density of deuteron tresinos has gone to zero so no further increase is possible with the given choice of the other model parameters. Note here an important point: This is likely to be the reason that no geophysical data are found with a higher value of 3He/4He.

Author's Specific response:

"It would also help to have different colors for the different proton content for the two plots in the Figure." This suggestion by the Referee has been adopted in my revised paper.

Author's Specific response:

"To my knowledge, there are no experimental evidences of their existence inside the Earth but that would be indeed a wonderful discovery!" I agree with this Referee's comment.

Author's Specific response:

"Of course, assessing the materials most operative in the Earth will have to be determined." It seems that some class of materials may be responsible, and yes my guess

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is that superconductivity will be only present in certain types of geophysical materials."

"Does the nuclear reaction occurs deep inside the Earth or at its surface?" In our earlier NPG paper (Mayer and Reitz, 2014), we had determined that the deuteron nuclear chain reactions take place relatively close to the surface rather than deeper in the Earth.

Author's Specific response:

"There is one point the author should consider in the manuscript. In order to have Cooper pairs, electrons need an attractive interaction that overcomes their natural Coulomb repulsion. In standard superconductors, this interaction is due to phonons, i.e. the vibrations of the crystal lattice; in novel and exotic superconductors, it is thought to derive from magnetic fluctuations." I agree with the Referee's comment here too. But the Author doesn't have anything further to contribute to this discussion, the Referee's discussion makes the physics points clearly. I do mention in the paper that the microphysics of Cooper pairs is undergoing much research as Referee 1 is well-aware of.

Author's Specific response:

"The introduction is not clear unless the reader knows the previous paper (Mayer and Reitz, 2014): it would be better to summarize its main findings in the current manuscript before moving on to present the new proposition". The Author has added a new Introduction section as per the Referee's suggestion.

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